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METHOD OF AMPLIFYING ELECTROMAGNETIC RADIATIONS OF ULTRAVIOLET, VISIBLE, INFRARED AND RADIO WAVE RANGE RADIATIONS

By

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V.A.Fabrikant; M.M.Vudynskiy and F.A.Butayeva

Proposed is method of amplifying electromagnetic radiation, based on the use of induced emission phenomena, theoretically developed by A.Einstein in 1917. At the given method of amplification there is no conversion of energy of amplified radiation into other forms of energy. The method is suitable for amplification of ultraviolet, visible, infrared radio range waves.

To bring the described amplification method into realization is produced a medium, having a negative absorption factor for radiations. The intensity of the radiation stream, which passed through such a medium, rises, which produces the amplification effect. The amplification factor equals $e^{(K)L}$, where K - absorption coefficient, L - thickness of the layer.

The medium with negative absorption factor is created on account of nonequilibrium distribution of particles of the medium (e.g. atoms or molecules) by the energy states. The concentration of particles in upper energy states should exceed (with consideration of statistical weights) the concentration of particles on the lower energy states. In the role of an example it was suggested to use a geaseous medium, filling a corresponding vessel, in which the required nonequilibrium conditions are created, e.g. by bombarding the gas with additional radiation, exciting the particles into corresponding energy states, or by passing an electric current

through the gas, with simultaneous utilization of admixtures, selectively destroying the particles, situated in lower energy states, or by modulating the current through the gas with the use of ion recombination phenomena and electron recombination phenomena for the purpose of obtaining particles in upper energy states.

Object of invention

Method of amplifying electromagnetic radiations (ultraviolet, visible, infrared and radio range waves), distinguished by the fact, that the boosted radiation is passed through a medium, in which with the aid of an auxiliary radiation or by another means is created the excessive, in comparison with equilibrium, concentration of atoms, other particles or their systems on upper energy levels, corresponding to excited states.

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